

No.

200400045



# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Tennessee Advanced Genetics, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

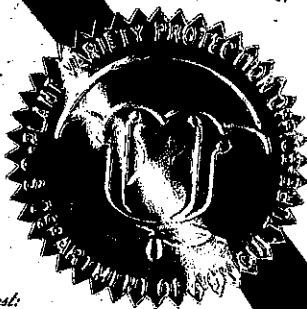
Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR USING IT IN PRODUCING A HYBRID OR PLANT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED, (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, 7 U.S.C. 2321 ET SEQ.)

SOYBEAN

'5601T'



In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this nineteenth day of November, in the year two thousand and four.

Attest:

*R. M. Z...*

Commissioner  
Plant Variety Protection Office  
Agricultural Marketing Service

*W. L. ...*  
Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE  
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE  
(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF OWNER <b>Tennessee Advanced Genetics, Inc.</b>		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME <b>TN96-58</b>	3. VARIETY NAME <b>5601T</b>
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) <b>2640-C Nolensville Road Nashville, TN 37211</b>		5. TELEPHONE (include area code) <b>615-242-0467</b>	FOR OFFICIAL USE ONLY PVPO NUMBER <b>2004 0004 5</b>
		6. FAX (include area code) <b>615-248-3461</b>	
7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) <b>Corporation</b>	8. IF INCORPORATED, GIVE STATE OF INCORPORATION <b>Tennessee</b>	9. DATE OF INCORPORATION <b>03/1996</b>	FILING DATE <b>12/12/2003</b>
10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. (First person listed will receive all papers) <b>David McKinney Tennessee Advanced Genetics, Inc. 2640-C Nolensville Road Nashville, TN 37211</b>			FILING AND EXAMINATION FEES: \$ <b>3652.00</b> DATE <b>12/12/2003</b> CERTIFICATION FEE: \$ <b>432.00</b> DATE <b>12/12/2003</b>
11. TELEPHONE (include area code) <b>(615) 242-0467</b>	12. FAX (include area code) <b>(615) 248-3461</b>	13. E-MAIL <b>dmckinney@superiorseeds.org</b>	14. CROP KIND (Common Name) <b>Soybean</b>
15. GENUS AND SPECIES NAME OF CROP <b>Glycine max L. Merr</b>		16. FAMILY NAME (Botanical) <b>Fabaceae</b>	17. IS THE VARIETY A FIRST GENERATION HYBRID? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
18. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse) a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of Variety d. <input checked="" type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) e. <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Owner's Ownership f. <input checked="" type="checkbox"/> Voucher Sample (2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository) g. <input checked="" type="checkbox"/> Filing and Examination Fee (\$3,652), made payable to "Treasurer of the United States" (Mail to the Plant Variety Protection Office)		19. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? See Section 83(a) of the Plant Variety Protection Act <input checked="" type="checkbox"/> YES (If "yes", answer items 20 and 21 below) <input type="checkbox"/> NO (If "no", go to item 22)	
		20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, WHICH CLASSES? <input checked="" type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> CERTIFIED	
		21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, SPECIFY THE NUMBER 1,2,3, etc. FOR EACH CLASS. <input checked="" type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input checked="" type="checkbox"/> CERTIFIED (If additional explanation is necessary, please use the space indicated on the reverse.)	
22. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. (Please use space indicated on reverse.)		23. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT (PLANT BREEDER'S RIGHT OR PATENT)? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. (Please use space indicated on reverse.)	
24. The owners declare that a viable sample of basic seed of the variety has been furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate. The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act. Owner(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.			

SIGNATURE OF OWNER

*David N. McKinney*

NAME (Please print or type)

David N. McKinney

SIGNATURE OF OWNER

NAME (Please print or type)

CAPACITY OR TITLE

Treasurer

DATE

12-04-03

CAPACITY OR TITLE

DATE

**GENERAL:** To be effectively filed with the Plant Variety Protection Office (PVPO), ALL of the following items must be received in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds, for a hybrid variety at least 2,500 untreated seeds of each line necessary to reproduce the variety, or for tuber reproduced varieties verification that a viable (in the sense that it will reproduce an entire plant) tissue culture will be deposited and maintained in an approved public repository; (4) check drawn on a U.S. bank for \$2,705 (\$320 filing fee and \$2,385 examination fee), payable to "Treasurer of the United States" (See Section 97.6 of the Regulations and Rules of Practice.) Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfilled. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 500, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of \$320 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

Plant Variety Protection Office

Telephone: (301) 504-5518

FAX: (301) 504-5291

Homepage: <http://www.ams.usda.gov/science/pvpo/pvp.htm>

#### ITEM

- 18a. Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method; (2) the details of subsequent stages of selection and multiplication; (3) evidence of uniformity and stability; and (4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified
- 18b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:
- (1) identify these varieties and state all differences objectively;
  - (2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and
  - (3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.
- 18c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.
- 18d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, etc.
- 18e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.
19. If "Yes" is specified (*seed of this variety be sold by variety name only, as a class of certified seed*), the applicant **MAY NOT** reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. (See *Regulations and Rules of Practice, Section 97.103*).
22. See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.
23. See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.

21. CONTINUED FROM FRONT (Please provide a statement as to the limitation and sequence of generations that may be certified.)

22. CONTINUED FROM FRONT (Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)

January 2003, sold to farmers

23. CONTINUED FROM FRONT (Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)

**NOTES:** It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. There is no charge for filing a change of address. The fee for filing a change of ownership or assignment or any modification of owner's name is specified in Section 97.175 of the regulations. (See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority. For example, for agricultural and vegetable crops, contact: Seed Branch, AMS, USDA, Room 213, Building 306, Beltsville Agricultural Research Center-East, Beltsville, MD 20705. Telephone: (301) 504-8089. <http://www.ams.usda.gov/lsg/seed/lsg-sd.htm>

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this collection of information is (0581-0055). The time required to complete this information collection is estimated to average 1.4 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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S&T-470 (04-01) designed by the Plant Variety Protection Office with WordPerfect 8.0a. Replaces STD-470 (02-99) which is obsolete

**EXHIBIT A: ORIGIN AND BREEDING HISTORY (AMENDED JUNE 2004)**

5601T is an F<sub>6</sub>-derived line from a bi-parental hybridization between 'Hutcheson' [1] and TN89-39. TN89-39 was a selection from the cross TN81-2 x TN80-69. TN81-2 was a selection from the cross 'Lee 74' x 'Mitchell' [2, 3]. TN80-69 was a selection from the cross 'Essex' x J74-40 [8]. J74-40 was a selection from the cross 'Forrest' (2) x D68-18 x PI88788 [5]. D68-18 was a selection from the cross 'Dyer' x 'Bragg' [4, 6]. The F<sub>1</sub> plants from Hutcheson x TN89-39 were grown in Knoxville, TN in 1992. Harvested F<sub>2</sub> seeds were sent to Costa Rica in January 1993 and grown for generation advancement, without selection, via single-pod descent, per plant, to the F<sub>5</sub> stage. The F<sub>5,6</sub> population was grown in Knoxville, TN in 1994 and agronomically desirable single-plants were harvested. The seeds from these single plants were grown as F<sub>6,7</sub> plant rows in Knoxville, TN in 1995, and a plant row was identified as visually desirable and bulk harvested. In 1996 seed from that row became designated as the experimental line TN96-58 and was entered in a Preliminary Yield Test grown at two locations (Knoxville and Jackson, TN). TN96-58 was then selected based on superior yield and other desirable agronomic traits. TN96-58 has been evaluated in Tennessee yield tests from 1996 to present. TN96-58 was entered in the Southern Regional Uniform Preliminary Group V Test in 1998 and the Southern Regional Uniform Group V Test in 1999, 2000, and 2001. TN96-58 was designated as the cultivar 5601T upon release in 2001 [7].

The variety 5601T has been reproduced and observed to be uniform and stable, with no variants or off-types, for the past four generations for characteristics listed in this application.

**REFERENCES**

1. Buss, G.R., H.M. Camper, Jr. and C.W. Roane. 1988. Registration of 'Hutcheson' soybean. *Crop Sci.* 28:1024-1025.
2. Caviness, C.E., R.D. Riggs, H.J. Walters. 1975. Registration of 'Lee 74' soybean. *Crop Sci.* 15:100.
3. <http://www.ars-grin.gov/cgi-bin/npgs/html/acchtml.pl?1443615>. 'Mitchell' soybean is PI 548679.
4. Hartwig, E.E. 1968. Registration of 'Dyer' soybean. *Crop Sci.* 8:402.
5. Hartwig, E.E. 1973. Registration of 'Forrest' soybean. *Crop Sci.* 13:287.
6. Hinson, K. and E.E. Hartwig. 1964. Registration of 'Bragg' soybean. *Crop Sci.* 6:664.
7. Pantalone, V.R., F.L. Allen, and D. Landau-Ellis. 2003. Registration of '5601T' soybean. *Crop Sci.* 43:3  
(*in press*).
8. Smith, T.J. and H.M. Camper. 1973. Registration of 'Essex' soybean. *Crop Sci.* 13:495.

**EXHIBIT B: STATEMENT OF DISTINCTNESS (AMENDED MAY 2004)**

'5601T' is most similar to 'Hutcheson' except that the **genomic DNA** of '5601T' exhibits a 239 base-pair length band, whereas 'Hutcheson' exhibits a 224 base-pair length band, when amplified via PCR using an M-13 fluorescent type of Satt156 simple sequence repeat primer at the **Satt156 locus of molecular linkage group L**. (See attached Figure P.1).

'5601T' is most similar to 'Hutcheson' except that the **genomic DNA** of '5601T' exhibits a 255 base-pair length band, whereas 'Hutcheson' exhibits a 261 base-pair length band, when amplified via PCR using an M-13 fluorescent type of Satt189 simple sequence repeat primer at the **Satt189 locus of molecular linkage group D1b**. (See attached Figure P.2).

'5601T' is most similar to 'Hutcheson' except that the **genomic DNA** of '5601T' exhibits a 265 base-pair length band, whereas 'Hutcheson' exhibits a 240 base-pair length band, when amplified via PCR using an M-13 fluorescent type of Satt288 simple sequence repeat primer at the **Satt288 locus of molecular linkage group G**. (See attached Figure P.3).

'5601T' is most similar to 'Hutcheson' except that the **genomic DNA** of '5601T' exhibits a 211 base-pair length band, whereas 'Hutcheson' exhibits a 226 base-pair length band, when amplified via PCR using an M-13 fluorescent type of Satt440 simple sequence repeat primer at the **Satt440 locus of molecular linkage group I**. (See attached Figure P.4).

'5601T' is most similar to 'Hutcheson' except that '5601T' is *significantly taller in plant height* than 'Hutcheson'. (See attached Plant Height Tables 1998, 1999, 2000, 2001, 2002, and 1998-2002, note that plant heights are reported in centimeters).

'5601T' is most similar to 'Hutcheson' except that '5601T' is *significantly smaller in seed size* than 'Hutcheson'. (See attached Seed Size Tables 1998, 1999, 2000, 2001, 2002, and 1998-2002, note that seed sizes are reported in milligrams per seed).

'5601T' is most similar to 'Hutcheson' except that '5601T' is *significantly higher in seed protein concentration* than 'Hutcheson'. (See attached Seed Protein Tables 1998, 1999, 2000, 2001, 2002, and 1998-2002, note that seed protein concentrations are reported in grams of protein per kilogram of seed on a dry-weight basis).

'5601T' is most similar to 'Hutcheson' except that '5601T' is *significantly lower in seed oil concentration* than 'Hutcheson'. (See attached Seed Oil Tables 1998, 1999, 2000, 2001, 2002, and 1998-2002, note that seed oil concentrations are reported in grams of oil per kilogram of seed on a dry-weight basis).

'5601T' is most similar to 'Hutcheson' except that '5601T' significantly exceeds 'Hutcheson' in **seed yield** per unit of land area (information previously submitted).

'5601T' is most similar to 'Hutcheson' except that '5601T' is superior to 'Hutcheson' for *tolerance* to Southern root knot nematode *Meloidogyne incognita* (information previously submitted).

'5601T' is most similar to 'Hutcheson' except that '5601T' is *moderately tolerant* to Peanut root knot nematode *Meloidogyne arenaria* while 'Hutcheson' is *highly susceptible*. (information previously submitted).

**EXHIBIT B** *continued*: STATEMENT OF DISTINCTNESS

2004 0 004 5

YIELD			Bu / ACRE	
YEAR	TEST	N LOCS	5601T	HUTCHESON
1998	UP VB	9	43.3*	38.7
1999	UT V <sup>1</sup>	24	43.9	43.0
2000	UT V <sup>1</sup>	22	50.1	44.5
2001	UT V	21	51.1	48.5
2002	UT V	18	42.9	40.0
MEAN			46.7*	43.6

N LOCS = Number of field testing locations

<sup>1</sup> = TN96-58 ranked #1 for seed yield among all entries evaluated

\* = significant difference between TN96-58 and Hutcheson at the 0.05 level

MATURITY			days after HUTCHESON	
YEAR	TEST	N LOCS	5601T	HUTCHESON
1998	UP VB	9	+2	0
1999	UT V	24	+2	0
2000	UT V	22	-3	0
2001	UT V	21	-1	0
2002	UT V	18	+0.1	0

HEIGHT			INCHES	
YEAR	TEST	N LOCS	5601T	HUTCHESON
1998	UP VB	9	29	25
1999	UT V	24	31	29
2000	UT V	22	33	30
2001	UT V	21	32	32
2002	UT V	18	32	29

PROTEIN			PERCENT PROTEIN	
YEAR	TEST	N LOCS	5601T	HUTCHESON
1998	UP VB	9	42.4	41.1
1999	UT V	24	42.0	40.9
2000	UT V	22	43.3	41.7
2001	UT V	21	41.2	40.1
2002	UT V	18		

SEED SIZE			g / 100 seed	
YEAR	TEST	N LOCS	5601T	HUTCHESON
1998	UP VB	9	12.6	13.5
1999	UT V	24	13.2	13.9
2000	UT V	22	12.3	12.5
2001	UT V	21	13.5	13.8
2002	UT V	18	13.6	13.9

SCN 2			1=RESISTANT 5=SUSCEPTIBLE	
YEAR	TEST	LOC	5601T	HUTCHESON
1998	UP VB	TN	5.0	4.1
1999	UT V	TN	5.0	5.0
2000	UT V	TN	5.0	4.9
2001	UT V	TN	4.6	4.7
2002	UT V	TN	4.9	3.8

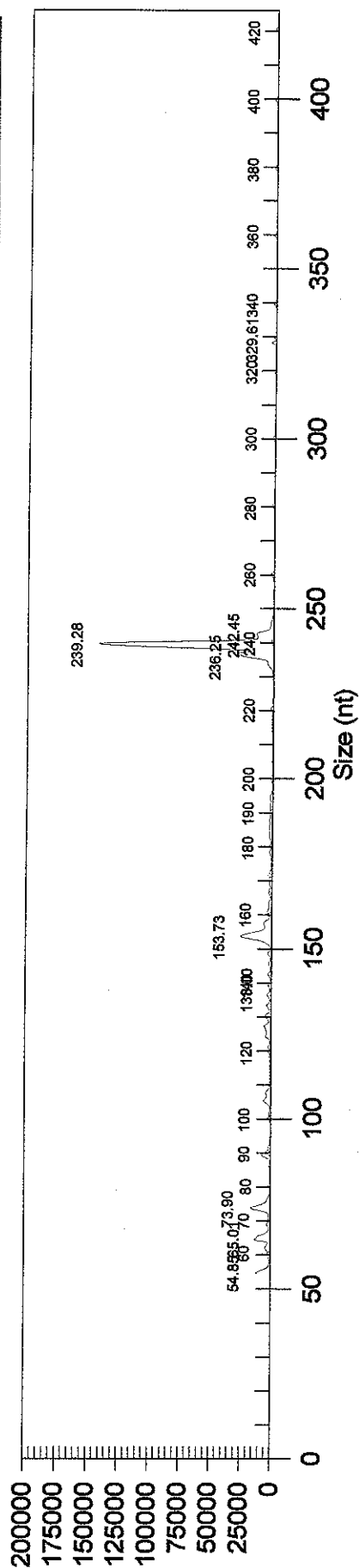
SCN 3			1=RESISTANT 5=SUSCEPTIBLE	
YEAR	TEST	LOC	5601T	HUTCHESON
1998	UP VB	TN	4.0	4.7
1999	UT V	TN	5.0	5.0
2000	UT V	TN	4.7	4.7
2001	UT V	TN	5.0	5.0
2002	UT V	TN	3.6	2.1

SCN 14			1=RESISTANT 5=SUSCEPTIBLE	
YEAR	TEST	LOC	5601T	HUTCHESON
1998	UP VB	TN	4.7	3.3
1999	UT V	TN	4.7	4.3
2000	UT V	TN	4.8	5.0
2001	UT V	TN	4.2	3.8
2002	UT V	TN	4.3	5.0

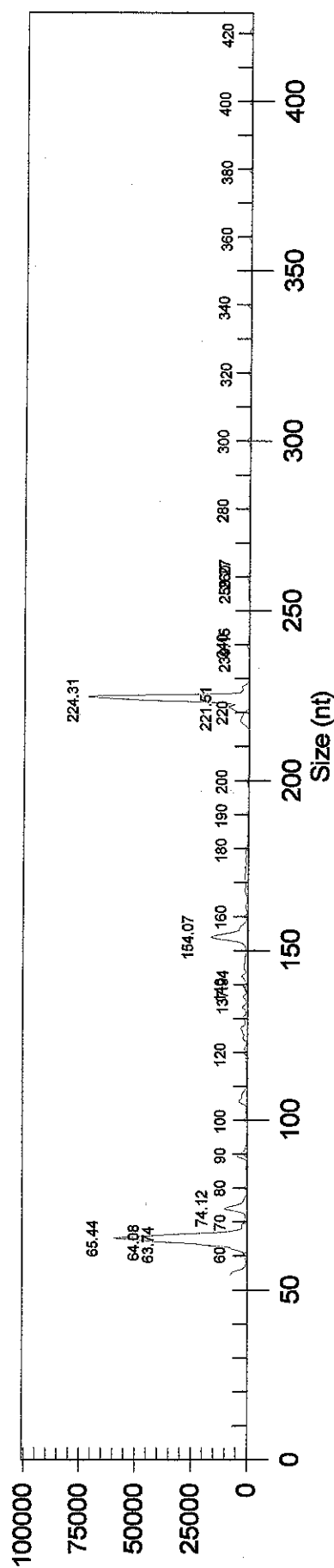
M. i.			1=RESISTANT 5=SUSCEPTIBLE	
YEAR	TEST	LOC	5601T	HUTCHESON
1998	UP VB	TN	2.3	4.0
1999	UT V	GA	1.0	5.0
2000	UT V	GA	1.3	4.5
2001	UT V	GA	3.8	4.8
2002	UT V	GA	2.3	5.0

M. a.			1=RESISTANT 5=SUSCEPTIBLE	
YEAR	TEST	LOC	5601T	HUTCHESON
1998	UP VB	TN	2.8	3.7
1999	UT V	GA	1.8	5.0
2000	UT V	GA	4.0	4.3
2001	UT V	GA	2.0	3.3
2002	UT V	GA	4.0	4.8

Satt156 MLG L

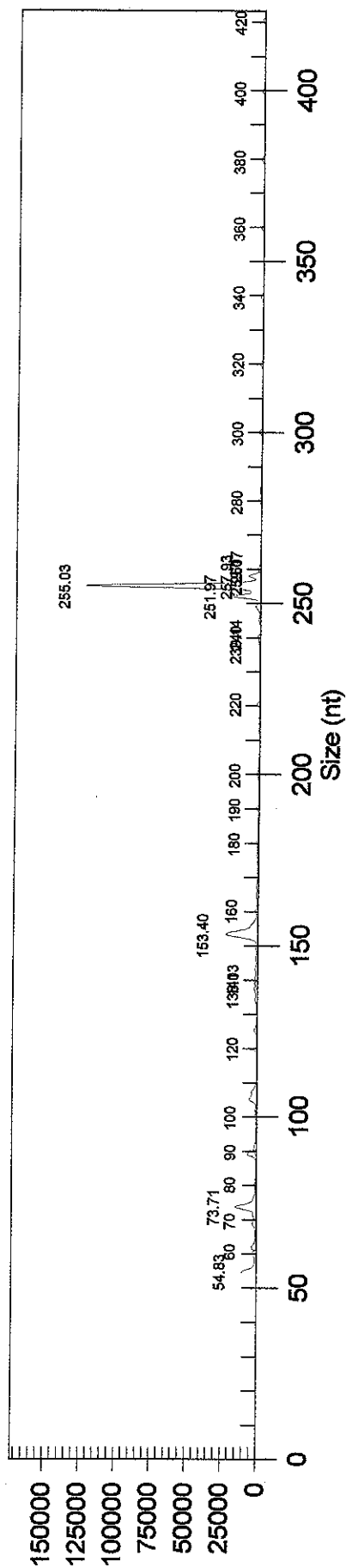


5601T - MSatt156

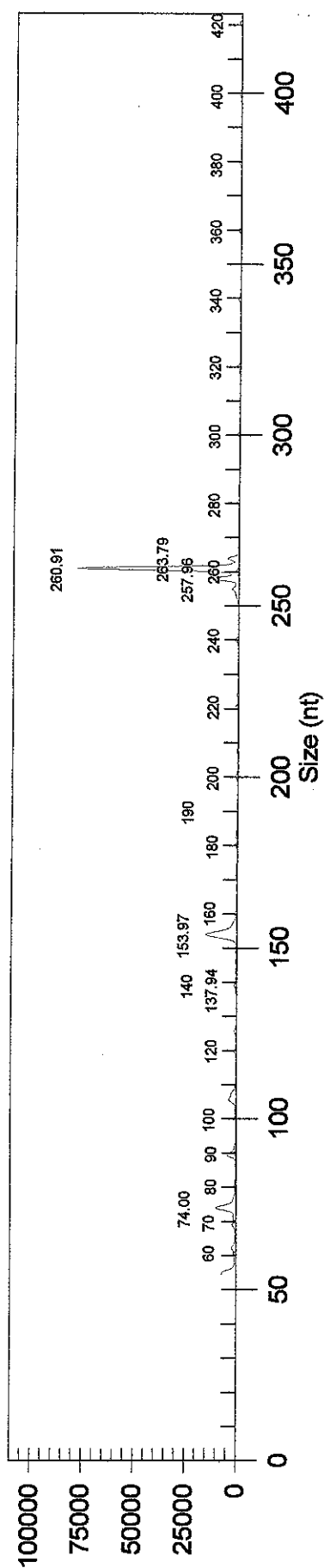


HUTCHESON - MSatt156

Satt189 MLG D1b



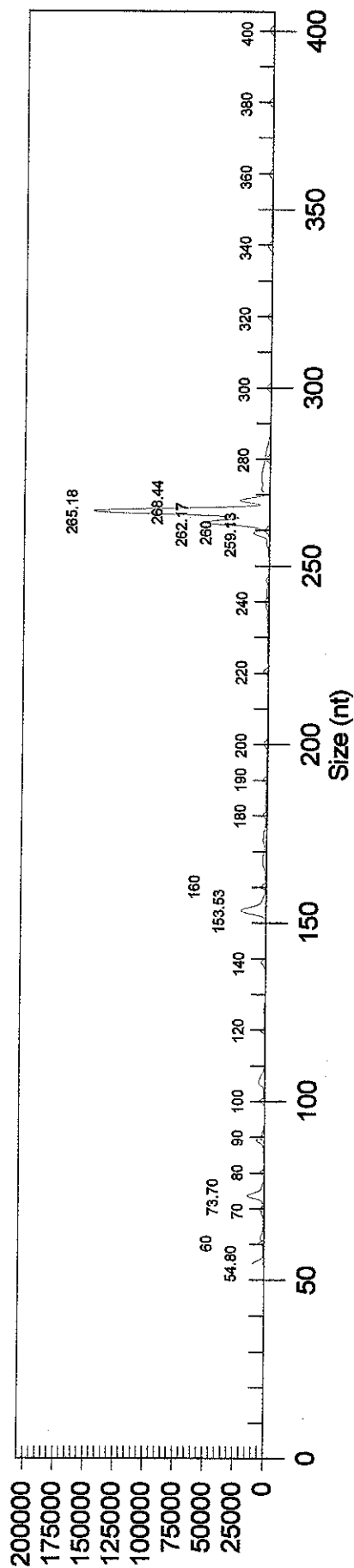
5601T - MSatt189



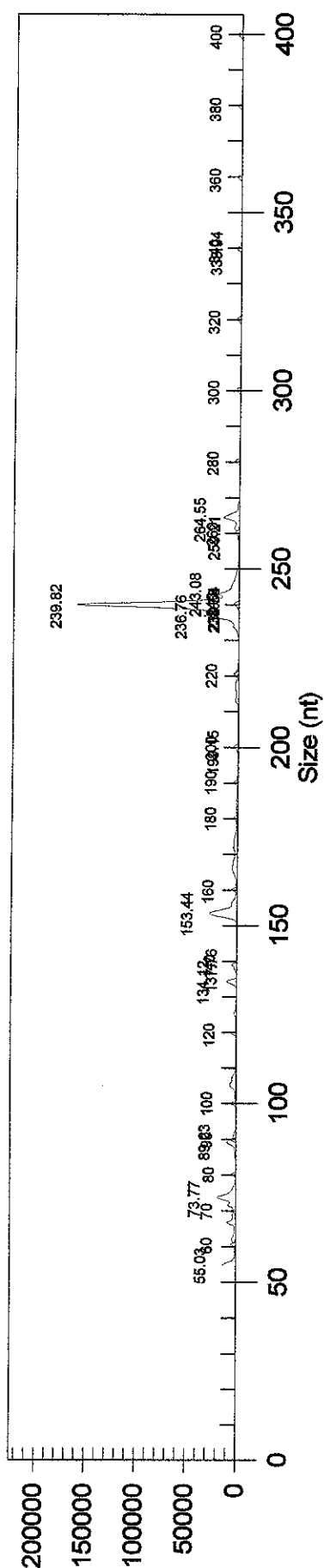
HUTCHESON - Msatt189



Satt288 MLG G

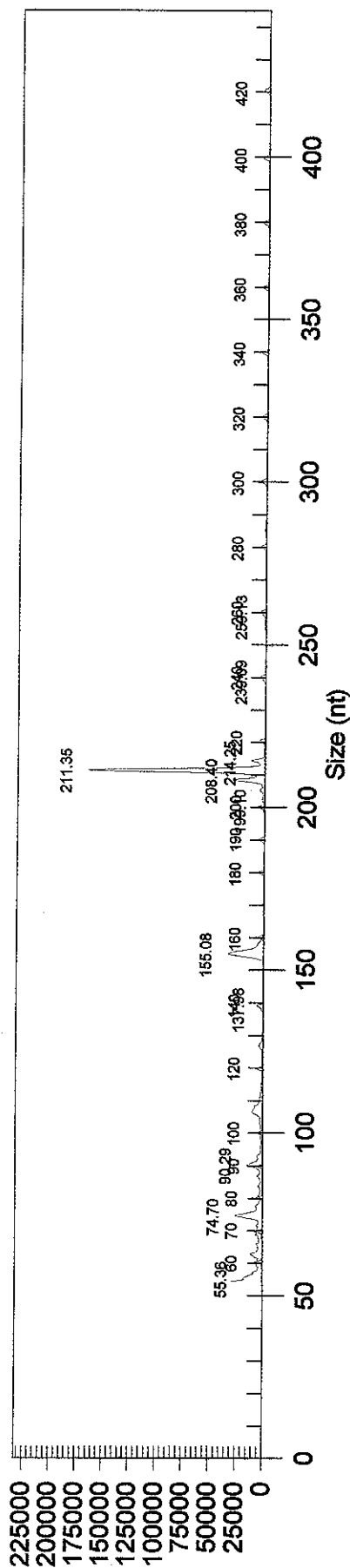


5601T - MSatt288

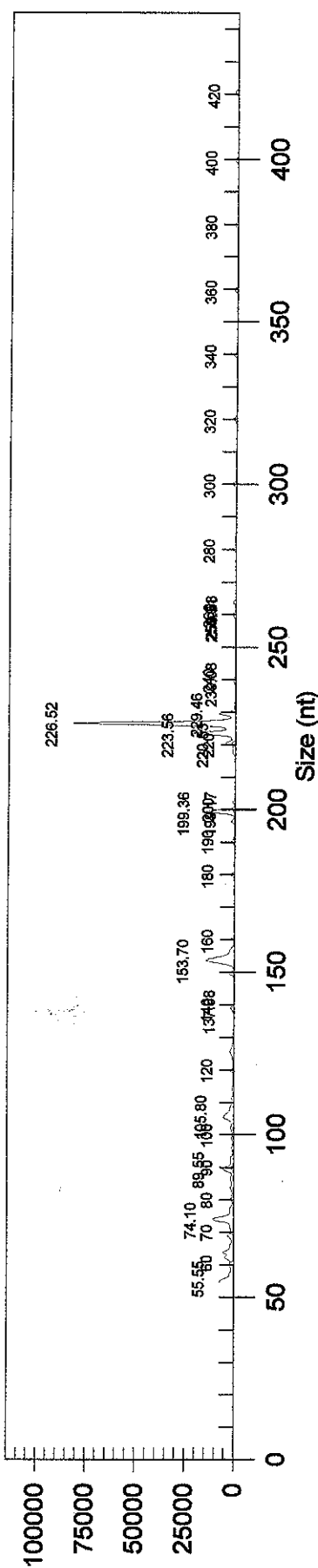


HUTCHESON - MSatt288

Satt440 MLG I



5601T - MSatt440



HUTCHESON - MSatt440

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**U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE  
SCIENCE AND TECHNOLOGY  
PLANT VARIETY PROTECTION OFFICE  
BELTSVILLE, MD 20705**

**EXHIBIT C  
(Soybean)**

**OBJECTIVE DESCRIPTION OF VARIETY  
SOYBEAN (*Glycine max* (L.) Merr.)**

NAME OF APPLICANT(S) <b>Tennessee Advanced Genetics, Inc.</b>	FOR OFFICIAL USE ONLY PVPO NUMBER <b>2004 00045</b>
ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code) <b>2640-C Nolensville Road Nashville, TN 37211</b>	VARIETY NAME <b>5601T</b>
	TEMPORARY OR EXPERIMENTAL DESIGNATION <b>TN96-58</b>

**PLEASE READ ALL INSTRUCTIONS CAREFULLY:** Place the appropriate number that describes the varietal character of this variety in the boxes below.

Place a zero in the first box (e.g. 

9	9	9
---	---	---

 or 

0	9
---	---

) when number is either 99 or less or 9 or less respectively. Data for quantitative

plant characters should be based on a minimum of 100 plants. Comparative data should be determined from varieties entered in the same trial. Royal Horticultural Society or any recognized color standard may be used to determine plant colors; designate system used:

Please answer all questions for your variety; lack of response may delay progress of your application.

**A. MORPHOLOGY**

**Seed Shape:**

- |  |  |   |
|--|--|---|
| <table border="1" style="display: inline-table;"><tr><td>1</td></tr></table> 1 = Spherical<br>(L/W, L/T, and T/W ratios < 1.2) | 1  | 2 = Spherical-Flattened<br>(L/W ratio > 1.2; L/T ratio < 1.2) |
| 1  |  |   |
| 3 = Elongate<br>(L/T ratio > 1.2; T/W ratio < 1.2)   | 4 = Elongate-Flattened<br>(L/T ratio > 1.2; T/W ratio > 1.2) |   |

**Seed Coat Color:**

- |   |   |           |           |           |                               |
|---|---|-----------|-----------|-----------|-------------------------------|
| <table border="1" style="display: inline-table;"><tr><td>1</td></tr></table> 1 = Yellow | 1 | 2 = Green | 3 = Brown | 4 = Black | 5 = Other<br>(Please Specify) |
| 1   |   |           |           |           |                               |

**Seed Coat Luster:**

- |   |   |           |
|---|---|-----------|
| <table border="1" style="display: inline-table;"><tr><td>1</td></tr></table> 1 = Dull | 1 | 2 = Shiny |
| 1   |   |           |

**Seed Size:**

- |  |   |   |
|--|---|---|
| <table border="1" style="display: inline-table;"><tr><td>1</td><td>3</td></tr></table> grams/100 seeds | 1 | 3 |
| 1  | 3 |   |

**Hilum Color:**

- |   |                            |            |           |          |                     |
|---|----------------------------|------------|-----------|----------|---------------------|
| <table border="1" style="display: inline-table;"><tr><td>1</td></tr></table> 1 = Buff | 1                          | 2 = Yellow | 3 = Brown | 4 = Gray | 5 = Imperfect Black |
| 1   |                            |            |           |          |                     |
| 6 = Black   | 7 = Other (Please Specify) |            |           |          |                     |

## A. MORPHOLOGY (Continued)

Cotyledon Color: mature seed

☐ 1 = Yellow      2 = Green

Seed Protein Peroxidase Activity:

☐ 1 = Low      2 = High

Hypocotyl Color:

<input type="checkbox"/> 1 = Green ( 'Evans' or 'Davis' )	<input type="checkbox"/> 2 = Green with Bronze Bands below Cotyledon ( 'Woodworth' or 'Tracy' )	<input type="checkbox"/> 3 = Light Purple below Cotyledons ( 'Beeson' or 'Pickett 71' )	<input type="checkbox"/> 4 = Dark Purple extending to unifoliolate leaves ( 'Hodgson', 'Coker', or 'Hampton 266A' )
--	---	---	---

Leaf Shape:

<input type="checkbox"/> 3 = Lanceolate	<input type="checkbox"/> 2 = Oval	<input type="checkbox"/> 3 = Ovate	<input type="checkbox"/> 4 = Other (Please Specify)
---	-----------------------------------	------------------------------------	---

Flower Color:

<input type="checkbox"/> 1 = White	<input type="checkbox"/> 2 = Purple	<input type="checkbox"/> 3 = White with a Purple Throat
------------------------------------	-------------------------------------	---

Pod Color:

<input type="checkbox"/> 1 = Tan	<input type="checkbox"/> 2 = Brown	<input type="checkbox"/> 3 = Black
----------------------------------	------------------------------------	------------------------------------

Pubescence Color:

<input type="checkbox"/> 1 = Gray	<input type="checkbox"/> 2 = Brown (Tawny)	<input type="checkbox"/> 3 = Light Tawny
-----------------------------------	--	--

Plant Habit:

<input type="checkbox"/> 1 = Determinate	<input type="checkbox"/> 2 = Semi - Determinate	<input type="checkbox"/> 3 = Indeterminate	<input type="checkbox"/> 4 = Intermediate
--	---	--	---

Maturity Group:

<input type="checkbox"/> 1 = 000	<input type="checkbox"/> 2 = 00	<input type="checkbox"/> 3 = 0	<input type="checkbox"/> 4 = I	<input type="checkbox"/> 5 = II
<input type="checkbox"/> 6 = III	<input type="checkbox"/> 7 = IV	<input type="checkbox"/> 8 = V	<input type="checkbox"/> 9 = VI	<input type="checkbox"/> 10 = VII
<input type="checkbox"/> 11 = VIII	<input type="checkbox"/> 12 = IX	<input type="checkbox"/> 13 = X	<input type="checkbox"/> 14 = XI	<input type="checkbox"/> 15 = XII

Maturity Subgroup:

☐ 6 Please enter a value from 0 - 9

## B. DISEASE REACTIONS

0 = Not Tested	1 = Susceptible	2 = Resistant	3 = Tolerant
----------------	-----------------	---------------	--------------

Bacterial

- ☐ 0 Bacterial Pustule (*Xanthomonas campestris* pv. *glycines* (Nakano) Dye)
- ☐ 0 Bacterial Blight (*Pseudomonas syringae* pv. *glycinea* (Coerper) Young, Dye, & Wilkie)
- ☐ 0 Wildfire Blight (*Pseudomonas syringae* pv. *tabaci* (Wolf & Foster) Young, Dye, & Wilkie)

# B. DISEASE REACTIONS (Continued)

0 = Not Tested

1 = Susceptible

2 = Resistant

2004-00045

## Fungal

☐ 0 Brown Spot (*Septoria glycines* Hemmi)

### Frogeye Leaf Spot (*Cercospora sojina* Hara)

☐  
☐

race 1

☐  
☐

race 2

☐  
3

race 3

☐

race 4

race 5

race 6

Other (Please Specify)

Naturally occurring population in Milan Tennessee

☐ 0

Target Spot (*Corynespora cassiicola* (Berk. & Curt.) Wei)

☐ 0

Downey Mildew (*Peronospora trifoliorum* var. *manchurica* (Naum.) Syd. ex Gäum)

☐ 0

Powdery Mildew (*Microsphaera diffusa* Cke. & Pk.)

☐ 0

Brown Stem Rot (*Phialophora gregata* (Allington & Chamberlain) W. Gams.)

☐ 2

Stem Canker (*Diaporthe phaseolorum* (Cke. & Ell.) Sacc. var. *caulivora* Athow & Caldwell)

☐ 0

Pod and Stem Blight (*Diaporthe phaseolorum* (Cke. & Ell.) Sacc. var. *sojae* (Lehman) Wehm.)

☐ 0

Purple Seed Stain (*Cercospora kikuchii* (T. Matsu. & Tomoyasu) Gardener)

☐ 0

Rhizoctonia Root Rot (*Rhizoctonia solani* Kühn)

### Phytophthora Root Rot (*Phytophthora megasperma* Drechs. f. sp. *glycinea* (Kuan & Erwin))

☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0

race 1

race 2

race 3

race 4

race 5

race 6

race 7

☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0

race 8

race 9

race 10

race 11

race 12

race 13

race 14

☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0

race 15

race 16

race 17

race 18

race 19

race 20

race 21

☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0  
☐ 0

race 22

race 23

race 24

race 25

race 26

Other (Please Specify)

☐ 0

Bud Blight (Tobacco Ringspot Virus)

☐ 0

Yellow Mosaic (Bean Yellow Mosaic Virus)

## B. DISEASE REACTIONS (Continued)

0 = Not Tested

1 = Susceptible

2 = Resistant

2004.00045

 Cowpea Mosaic (Cowpea Chlorotic Virus) Pod Mottle (Bean Pod Mottle Virus) Seed Mottle (Soybean Mosaic Virus)

## Nematode

Soybean Cyst Nematode (*Heterodera glycines* Ichinohe) race 1 race 4 race 9 race 2 race 5 race 14 race 3 race 6 Other (Please Specify) Lance Nematode (*Hoplolaimus columbus* Sher) Southern Root Knot Nematode (*Meloidogyne incognita* (Kofoid & White) Chitwood) Northern Root Knot Nematode (*Meloidogyne hapla* Chitwood) Peanut Root Knot Nematode (*Meloidogyne arenaria* (Neal) Chitwood) Reniform Nematode (*Rotylenchus reniformus* Linwood & Olivera) Javanese Nematode (*Meloidogyne javanica* (Treub) Chitwood) Other Nematode (Please Specify)

## C. PHYSIOLOGICAL RESPONSES

0 = Not Tested

1 = Susceptible

2 = Resistant

3 = Tolerant

 Iron Chlorosis on Calcareous Soil Phosphorus Other (Please Specify) \_\_\_\_\_ Boron Aluminum Salt Drought

## D. INSECT REACTIONS

0 = Not Tested

1 = Susceptible

2 = Resistant

3 = Tolerant

☐ Mexican Bean Beetle (*Epilachna varivestis* Mulsant)☐ Potato Leaf Hopper (*Empoasca fabae* (Harris))☐ Other (Please Specify)

## E. HERBICIDE REACTIONS

0 = Not Tested

1 = Susceptible

2 = Resistant

☐ Metribuzin☐ Bentazone☐ Sulfonylurea☐ 1 Glyphosate☐ Glufosinate☐ Pendimethalin☐ Other (Please Specify)

## F. TRANSGENIC COMPOSITION

Has the development of the subject variety included the insertion of genetic material from an organism other than a soybean, or, the removal of genetic material from the application variety?

If yes, please complete the following information requests\*. Use additional pages if necessary.

☐ YES ☒ NO

1. Please state the vector's name:
2. Please state the vector components:
3. Please describe the genetic material successfully transferred into the subject variety:
4. Please describe the insertion protocol:

\* A literature citation(s) explaining the four information requests above may be an acceptable alternative to completion of the "Transgenic Composition" portion of this form.

## G. BIOCHEMICAL MARKERS

Please describe any biochemical information here, which you believe will be helpful in further describing the subject variety (e.g. Simple Sequence Repeats, Restriction Fragment Length Polymorphisms, Isozymic Characterization). Use additional pages if necessary.





*Plant Height Table 1998. Mean plant height, per location, in the 1998 USDA-ARS Southern Uniform Test.*

200400045

1998 Location	Plant Height (cm)	
	'5601T'	'Hutcheson'
BIXBY,OK98	76.2	59.7
JACKSON,TN98	86.4	74.9
KEISER,AR98	74.9	60.3
PITTSBURG,KS98	105.4	94.6
PLYMOUTH,NC98	87.6	68.6
PORTAGEVILLE,MO(A)98	63.5	67.3
QUEENSTOWN,MD98	88.9	71.1
STONEVILLE,MS98	33.0	27.9
ULLIN,IL98	59.7	56.5
WARSAW,VA98	63.5	59.0
<b>1998 Mean</b>	<b>73.9</b>	<b>64.0</b>
Statistical analysis via ANOVA, '5601T' differs significantly from 'Hutcheson'		
F-value = 19.2, P-value = 0.0018		
R <sup>2</sup> = 96.6%, CV = 8.4%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

Plant Height Table 1999. Mean plant height, per location, in the 1999 USDA-ARS Southern Uniform Test.

200400045

1999 Location	Plant Height (cm)	
	'5601T'	'Hutcheson'
BELLE MINA,AL99	69.4	78.7
BIXBY,OK99	61.0	55.9
BOSSIER CITY,LA99	80.4	73.7
GEORGETOWN,DE99	114.3	81.3
Knoxville,TN99	80.4	74.5
MCCUNE,KS99	51.6	50.0
PINE TREE,AR99	59.3	61.8
PLYMOUTH,NC99	87.2	77.9
PORTAGEVILLE,MO(A)99	76.2	76.2
PORTAGEVILLE,MO(B)99	71.10	68.6
PRINCETON,KY99	109.20	92.7
PROSPER,TX99	33.0	40.60
QUEENSTOWN,MD99	83.80	73.7
SPRINGFIELD,TN99	71.1	66.9
STONEVILLE,MS99	71.1	66.0
STUTTGART,AR99	94.0	88.9
SUFFOLK,VA99	88.0	81.3
ULLIN,IL99	86.40	93.1
WARSAW,VA99	61.0	63.5
<b>1999 Mean</b>	<b>76.2</b>	<b>71.8</b>
Statistical analysis via ANOVA, '5601T' differs significantly from 'Hutcheson' F-value = 4.2, P-value = 0.05 R <sup>2</sup> = 93.5%, CV = 10.6%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

Plant Height Table 2000. Mean plant height, per location, in the 2000 USDA-ARS Southern Uniform Test.

200400045

2000 Location	Plant Height (cm)	
	'5601T'	'Hutcheson'
BELLE MINA,AL00	80.4	69.8
BOSSIER CITY,LA00	68.6	58.4
CALHOUN,GA00	72.0	66.0
GEORGETOWN,DE00	111.8	99.1
Knoxville,TN00	88.0	87.2
MCCUNE,KS00	78.7	63.5
ORANGE,VA00	99.1	82.1
PITTSBURG,KS00	96.5	86.4
PORTAGEVILLE,MO(A)00	80.4	74.5
PORTAGEVILLE,MO(B)00	50.8	50.8
PRINCETON,KY00	114.3	104.1
QUEENSTOWN,MD00	94.0	83.80
SPRINGFIELD,TN00	76.2	63.5
STARKVILLE,MS00	76.2	66.0
STONEVILLE,MS00	45.7	71.1
STUTTGART,AR00	78.7	71.1
SUFFOLK,VA00	52.5	50.0
ULLIN,IL00	98.2	96.5
WARSAW,VA00	89.7	83.0
<b>2000 Mean</b>	<b>81.7</b>	<b>75.1</b>
Statistical analysis via ANOVA, '5601T' differs significantly from 'Hutcheson' F-value = 12.67, P-value = 0.0022 R <sup>2</sup> = 98.0%, CV = 6.0%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

*Plant Height Table 2001. Mean plant height, per location, in the 2001 USDA-ARS Southern Uniform Test.*

2001 Location	Plant Height (cm)	
	'5601T'	'Hutcheson'
BELLE MINA,AL01	76.2	83.0
BOSSIER CITY,LA01	73.7	62.6
GEORGETOWN,DE01	88.9	89.7
KEISER,AR01	96.5	101.6
Knoxville,TN01	77.0	76.2
MCCUNE,KS01	75.4	61.8
ORANGE,VA01	110.1	111.8
PINE TREE,AR01	104.1	96.5
PITTSBURG,KS01	72.0	64.3
PLYMOUTH,NC01	81.3	71.1
PORTAGEVILLE,MO(A)01	73.7	83.8
PORTAGEVILLE,MO(B)01	92.3	88.0
PRINCETON,KY01	107.5	99.9
PROSPER,TX01	58.4	48.3
QUEENSTOWN,MD01	86.4	76.2
SPRINGFIELD,TN01	116.0	110.1
STARKVILLE,MS01	63.5	61.0
STONEVILLE,MS01	81.3	101.6
STUTTGART,AR01	41.9	52.1
SUFFOLK,VA01	67.7	71.1
ULLIN,IL01	72.8	88.9
WARSAW,VA01	86.4	80.4
<b>2001 Mean</b>	<b>82.0</b>	<b>80.9</b>
Statistical analysis via ANOVA, No significant difference in 2001		

Uniform test plots typically consist of four-row plots,  
20 feet in length, replicated 3-times per location.

Plant Height Table 2002. Mean plant height, per location, in the 2002 USDA-ARS Southern Uniform Test.

200400045

2002 Location	Plant Height (cm)	
	'5601T'	'Hutcheson'
BELLE MINA,AL02	66.0	63.5
BIXBY,OK02	76.2	66.0
BOSSIER CITY,LA02	62.6	55.0
GEORGETOWN,DE02	113.4	109.2
KEISER,AR02	100.8	88.0
Knoxville,TN02	94.8	74.5
MARIANNA,AR02	84.7	87.2
MCCUNE,KS02	90.6	79.6
ORANGE,VA02	80.4	78.7
PITTSBURG,KS02	66.9	57.6
PORTAGEVILLE,MO(A)02	81.3	71.1
PORTAGEVILLE,MO(B)02	71.1	61.0
PRINCETON,KY02	104.1	94.0
PROSPER,TX02	39.8	35.6
QUEENSTOWN,MD02	90.6	77.9
STONEVILLE,MS02	61.0	61.0
SUFFOLK,VA02	75.4	70.3
ULLIN,IL02	83.8	88.9
WARSAW,VA02	75.4	64.3
<b>2002 Mean</b>	<b>79.9</b>	<b>72.8</b>
Statistical analysis via ANOVA, '5601T' differs significantly from 'Hutcheson' F-value = 19.72, P-value = 0.0003 R <sup>2</sup> = 95.2%, CV = 9.5%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

*Plant Height Table 1998-2002. Five-year mean plant height in the  
USDA-ARS Southern Uniform Tests*

200400045

Year	Plant Height (cm)	
	'5601T'	'Hutcheson'
1998	73.9	64.0
1999	76.2	71.8
2000	81.7	75.1
2001	82.0	80.9
2002	79.9	72.8
<b>Mean 1998-2002</b>	<b>78.7</b>	<b>72.9</b>
Statistical analysis via ANOVA, '5601T' <i>differs significantly</i> from 'Hutcheson' F-value = 30.9, P-value = 0.0001 $R^2 = 96.1\%$ , CV = 8.4%		

Uniform test plots typically consist of four-row plots, 20 feet in length,  
Replicated 3-times per environment.

*Seed Size Table 1998. Mean Seed Size, per location, in the 1998 USDA-ARS Southern Uniform Test.*

1998 Location	Seed Size (mg/seed)	
	'5601T'	'Hutcheson'
BIXBY,OK98	145.0	157.0
JACKSON,TN98	131.0	133.2
PITTSBURG,KS98	96.0	112.0
PLYMOUTH,NC98	140.0	154.0
PORTAGEVILLE,MO(A)98	105.0	121.5
QUEENSTOWN,MD98	141.5	161.2
STONEVILLE,MS98	107.0	122.0
ULLIN,IL98	99.0	108.2
WARSAW98	135.5	133.8
<b>1998 Mean</b>	<b>122.2</b>	<b>133.7</b>
Statistical analysis via ANOVA, '5601T' <i>differs significantly</i> from 'Hutcheson'		
F-value = 17.1, P-value = 0.0033		
$R^2 = 94.5\%$ , CV = 5.3%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

*Seed Size Table 1999. Mean Seed Size, per location, in the 1999 USDA-ARS Southern Uniform Test.*

1999 Location	Seed Size (mg/seed)	
	'5601T'	'Hutcheson'
BELLE MINA,AL99	98.0	117.0
BIXBY,OK99	146.0	167.0
Knoxville,TN99	118.0	138.0
MCCUNE,KS99	136.0	134.0
PINE TREE,AR99	166.0	162.3
PLYMOUTH,NC99	114.0	125.0
PORTAGEVILLE,MO(A)99	132.0	133.0
PORTAGEVILLE,MO(B)99	121.0	134.0
PRINCETON,KY99	140.0	125.00
PROSPER,TX99	96.0	109.0
QUEENSTOWN,MD99	118.3	138.0
SPRINGFIELD,TN99	112.0	132.0
STONEVILLE,MS99	143.0	152.0
SUFFOLK,VA99	98.0	109.3
ULLIN,IL99	102.0	108.3
WARSAW,VA99	147.0	156.0
<b>1999 Mean</b>	<b>124.2</b>	<b>133.7</b>
Statistical analysis via ANOVA, '5601T' <i>differs significantly</i> from 'Hutcheson' F-value = 12.24, P-value = 0.0032 $R^2 = 97.7\%$ , CV = 6.4%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.



*Seed Size Table 2000. Mean Seed Size, per location, in the 2000 USDA-ARS Southern Uniform Test.*

2000 Location	Seed Size (mg/seed)	
	'5601T'	'Hutcheson'
BELLE MINA,AL00	106.0	123.0
CALHOUN,GA00	140.0	140.0
Knoxville,TN00	133.0	143.0
MCCUNE,KS00	109.0	118.0
ORANGE,VA00	150.3	158.3
PITTSBURG,KS00	99.0	112.0
PORTAGEVILLE,MO(A)00	111.0	134.0
PORTAGEVILLE,MO(B)00	122.0	135.0
PRINCETON,KY00	135.0	145.0
QUEENSTOWN,MD00	145.0	161.0
SPRINGFIELD,TN00	123.0	130.0
STONEVILLE,MS00	122.0	112.0
SUFFOLK,VA00	139.0	163.7
ULLIN,IL00	131.7	127.3
WARSAW,VA00	142.7	140.0
<b>2000 Mean</b>	<b>127.2</b>	<b>136.2</b>
Statistical analysis via ANOVA, '5601T' differs significantly from 'Hutcheson' F-value = 8.36, P-value = 0.0119 $R^2 = 96.8\%$ , CV = 5.2%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

*Seed Size Table 2001. Mean Seed Size, per location, in the 2001 USDA-ARS Southern Uniform Test.*

2001 Location	Seed Size (mg/seed)	
	'5601T'	'Hutcheson'
BELLE MINA,AL01	182.3	168.3
Knoxville,TN01	118.0	130.0
MCCUNE,KS01	139.0	151.0
ORANGE,VA01	116.0	128.3
PINE TREE,AR01	150.3	153.3
PITTSBURG,KS01	136.0	142.0
PLYMOUTH,NC01	143.0	154.0
PORTAGEVILLE,MO(A)01	128.0	142.0
PORTAGEVILLE,MO(B)01	140.0	145.0
PRINCETON,KY01	127.0	118.0
QUEENSTOWN,MD01	124.0	123.7
STONEVILLE,MS01	109.0	109.0
SUFFOLK,VA01	125.3	124.3
ULLIN,IL01	127.0	125.0
WARSAW,VA01	139.7	148.3
<b>2001 Mean</b>	<b>133.6</b>	<b>137.5</b>
Statistical analysis via ANOVA, No significant difference in 2001		

Uniform test plots typically consist of four-row plots,  
20 feet in length, replicated 3-times per location.

*Seed Size Table 2002. Mean Seed Size, per location, in the  
2002 USDA-ARS Southern Uniform Test.*

200400045

2002 Location	Seed Size (mg/seed)	
	'5601T'	'Hutcheson'
BIXBY,OK02	163.0	137.0
Knoxville,TN02	123.0	143.0
MCCUNE,KS02	125.0	132.0
ORANGE,VA02	183.3	186.7
PITTSBURG,KS02	116.0	111.0
PLYMOUTH,NC02	157.0	174.0
PORTAGEVILLE,MO(A)02	123.0	121.0
PORTAGEVILLE,MO(B)02	111.0	107.0
PRINCETON,KY02	108.1	111.2
PROSPER,TX02	119.0	133.0
SUFFOLK,VA02	165.7	171.0
ULLIN,IL02	143.7	148.3
WARSAW,VA02	155.7	170.7
<b>2002 Mean</b>	<b>138.0</b>	<b>142.0</b>
Statistical analysis via ANOVA, No significant difference in 2001		

Uniform test plots typically consist of four-row plots,  
20 feet in length, replicated 3-times per location.

*Seed Size Table 1998-2002. Five-year mean Seed Size in the  
USDA-ARS Southern Uniform Tests*

200400045

Year	Seed Size (mg/seed)	
	'5601T'	'Hutcheson'
1998	122.2	133.7
1999	124.2	133.7
2000	127.2	136.2
2001	133.6	137.5
2002	138.0	142.0
<b>Mean 1998-2002</b>	<b>129.0</b>	<b>136.6</b>
Statistical analysis via ANOVA, '5601T' <i>differs</i> <i>significantly</i> from 'Hutcheson' F-value = 31.2, P-value = 0.0001 $R^2 = 96.8\%$ , CV = 5.9%		

Uniform test plots typically consist of four-row plots, 20 feet in length,  
Replicated 3-times per environment.

*Seed Protein Concentration Table 1998. Mean Seed Protein Concentration, per location, in the 1998 USDA-ARS Southern Uniform Test.*

1998 Location	Seed Protein Concentration (g/kg dry weight)	
	'5601T'	'Hutcheson'
JACKSON,TN98	435	424
PLYMOUTH,NC98	423	398
PORTAGEVILLE,MO(A)98	440	428
QUEENSTOWN,MD98	419	389
STONEVILLE,MS98	406	392
ULLIN,IL98	435	426
WARSAW,VA98	412	416
<b>1998 Mean</b>	<b>424</b>	<b>411</b>
Statistical analysis via ANOVA, '5601T' <i>differs significantly</i> from 'Hutcheson' F-value = 10.71, P-value = 0.0170 $R^2 = 96.9\%$ , CV = 1.2%		

Uniform test plots typically consist of four-row plots,  
20 feet in length, replicated 3-times per location.

*Seed Protein Concentration Table 1999. Mean Seed Protein Concentration, per location, in the 1999 USDA-ARS Southern Uniform Test.*

1999 Location	Seed Protein Concentration (g/kg dry weight)	
	'5601T'	'Hutcheson'
BELLE MINA,AL99	454	442
Knoxville,TN99	442	426
MCCUNE,KS99	364	381
PINE TREE,AR99	432	408
PLYMOUTH,NC99	421	411
PORTAGEVILLE,MO(A)99	419	410
PRINCETON,KY99	449	403
PROSPER,TX99	438	450
QUEENSTOWN,MD99	434	429
STONEVILLE,MS99	431	408
SUFFOLK,VA99	429	433
ULLIN,IL99	469	468
WARSAW,VA99	383	376
<b>1999 Mean</b>	<b>428</b>	<b>419</b>
Statistical analysis via ANOVA, '5601T' <i>differs</i> from 'Hutcheson' but at a 0.10 probability level. F-value = 4.13, P-value = 0.0649 $R^2 = 91.1\%$ , CV = 2.7%		

Uniform test plots typically consist of four-row plots,  
20 feet in length, replicated 3-times per location.

Seed Protein Concentration Table 2000. Mean Seed Protein Concentration, per location, in the 2000 USDA-ARS Southern Uniform Test.

200400045

2000 Location	Seed Protein Concentration (g/kg dry weight)	
	'5601T'	'Hutcheson'
BELLE MINA,AL00	414	405
Knoxville,TN00	420	407
ORANGE,VA00	421	405
PITTSBURG,KS00	459	435
PORTAGEVILLE,MO(A)00	430	415
PRINCETON,KY00	442	426
QUEENSTOWN,MD00	444	426
SPRINGFIELD,TN00	415	403
STONEVILLE,MS00	457	418
SUFFOLK,VA00	413	405
ULLIN,IL00	440	423
WARSAW,VA00	436	412
<b>2000 Mean</b>	<b>433</b>	<b>415</b>
Statistical analysis via ANOVA, '5601T' differs significantly from 'Hutcheson' F-value = 52.94, P-value = 0.0001 R <sup>2</sup> = 94.3%, CV = 1.4%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

*Seed Protein Concentration Table 2001. Mean Seed Protein Concentration, per location, in the 2001 USDA-ARS Southern Uniform Test.*

2001 Location	Seed Protein Concentration (g/kg dry weight)	
	'5601T'	'Hutcheson'
Knoxville, TN01	429	411
MCCUNE, KS01	396	400
ORANGE, VA01	404	393
PLYMOUTH, NC01	417	400
PORTAGEVILLE, MO(A)01	427	409
PRINCETON, KY01	404	386
PROSPER, TX01	408	418
QUEENSTOWN, MD01	409	409
STONEVILLE, MS01	415	398
ULLIN, IL01	421	408
WARSAW, VA01	393	387
<b>2001 Mean</b>	<b>411</b>	<b>402</b>
Statistical analysis via ANOVA, '5601T' <i>differs</i> <i>significantly</i> from 'Hutcheson' F-value = 9.75, P-value = 0.0108 $R^2 = 82.8\%$ , CV = 1.7%		

Uniform test plots typically consist of four-row plots,  
20 feet in length, replicated 3-times per location.



*Seed Protein Concentration Table 2002. Mean Seed Protein Concentration, per location, in the 2002 USDA-ARS Southern Uniform Test.*

2002 Location	Seed Protein Concentration (g/kg dry weight)	
	'5601T'	'Hutcheson'
BIXBY,OK02	419	420
Knoxville,TN02	419	394
MCCUNE,KS02	388	397
ORANGE,VA02	382	377
PLYMOUTH,NC02	411	403
PORTAGEVILLE,MO(A)02	402	381
PRINCETON,KY02	435	425
PROSPER,TX02	426	418
STONEVILLE,MS02	401	391
ULLIN,IL02	406	387
WARSAW,VA02	429	430
<b>2002 Mean</b>	<b>411</b>	<b>402</b>
Statistical analysis via ANOVA, '5601T' <i>differs</i> <i>significantly</i> from 'Hutcheson' F-value = 7.87, P-value = 0.0186 R <sup>2</sup> = 92.1%, CV = 1.8%		

Uniform test plots typically consist of four-row plots,  
20 feet in length, replicated 3-times per location.

Seed Protein Concentration Table 1998-2002. Five-year mean  
Seed Protein Concentration in the USDA-ARS Southern Uniform Tests

200400045

Year	Seed Protein Concentration (g/kg dry weight)	
	'5601T'	'Hutcheson'
1998	424	411
1999	428	419
2000	433	415
2001	411	402
2002	411	402
<b>Mean 1998-2002</b>	<b>421</b>	<b>410</b>
Statistical analysis via ANOVA, '5601T' differs significantly from 'Hutcheson' F-value = 51.53, P-value = 0.0001 R <sup>2</sup> = 99.6%, CV = 1.2%		

Uniform test plots typically consist of four-row plots, 20 feet in length,  
Replicated 3-times per environment.

*Seed Oil Concentration Table 1998. Mean Seed Oil Concentration, per location, in the 1998 USDA-ARS Southern Uniform Test.*

1998 Location	Seed Oil Concentration (g/kg dry weight)	
	'5601T'	'Hutcheson'
JACKSON, TN98	198	207
PLYMOUTH, NC98	196	210
PORTAGEVILLE, MO(A)98	189	201
QUEENSTOWN, MD98	195	214
STONEVILLE, MS98	196	219
ULLIN, IL98	190	203
WARSAW, VA98	209	212
<b>1998 Mean</b>	<b>196</b>	<b>209</b>
Statistical analysis via ANOVA, '5601T' <i>differs significantly</i> from 'Hutcheson' F-value = 27.55, P-value = 0.0019 $R^2 = 91.9\%$ , CV = 2.1%		

Uniform test plots typically consist of four-row plots,  
20 feet in length, replicated 3-times per location.

*Seed Oil Concentration Table 1999. Mean Seed Oil Concentration, per location, in the 1999 USDA-ARS Southern Uniform Test.*

200400045

1999 Location	Seed Oil Concentration (g/kg dry weight)	
	'5601T'	'Hutcheson'
BELLE MINA,AL99	181	197
Knoxville,TN99	197	212
MCCUNE,KS99	187	193
PINE TREE,AR99	196	212
PLYMOUTH,NC99	187	199
PORTAGEVILLE,MO(A)99	194	204
PRINCETON,KY99	175	197
PROSPER,TX99	183	189
QUEENSTOWN,MD99	187	192
STONEVILLE,MS99	192	211
SUFFOLK,VA99	180	187
ULLIN,IL99	173	183
WARSAW,VA99	202	201
<b>1999 Mean</b>	<b>187</b>	<b>198</b>
Statistical analysis via ANOVA, '5601T' <i>differs significantly</i> from 'Hutcheson' F-value = 37.75, P-value = 0.0001 $R^2 = 91.1\%$ , CV = 2.4		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

Seed Oil Concentration Table 2000. Mean Seed Oil Concentration, per location, in the 2000 USDA-ARS Southern Uniform Test.

200400045

2000 Location	Seed Oil Concentration (g/kg dry weight)	
	'5601T'	'Hutcheson'
BELLE MINA,AL00	197	207
Knoxville,TN00	202	217
ORANGE,VA00	197	199
PITTSBURG,KS00	185	197
PORTAGEVILLE,MO(A)00	194	200
PRINCETON,KY00	193	204
QUEENSTOWN,MD00	186	196
SPRINGFIELD,TN00	191	212
STONEVILLE,MS00	194	207
SUFFOLK,VA00	200	195
ULLIN,IL00	194	205
WARSAW,VA00	193	208
<b>2000 Mean</b>	<b>194</b>	<b>204</b>
Statistical analysis via ANOVA, '5601T' differs significantly from 'Hutcheson' F-value = 27.34, P-value = 0.0003 $R^2 = 82.6\%$ , CV = 2.4%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

*Seed Oil Concentration Table 2001. Mean Seed Oil Concentration, per location, in the 2001 USDA-ARS Southern Uniform Test.*

2001 Location	Seed Oil Concentration (g/kg dry weight)	
	'5601T'	'Hutcheson'
Knoxville, TN01	205	217
MCCUNE, KS01	216	212
ORANGE, VA01	202	211
PLYMOUTH, NC01	201	212
PORTAGEVILLE, MO(A)01	210	214
PRINCETON, KY01	207	220
PROSPER, TX01	218	209
QUEENSTOWN, MD01	193	201
STONEVILLE, MS01	209	220
ULLIN, IL01	209	216
WARSAW, VA01	198	215
<b>2001 Mean</b>	<b>206</b>	<b>213</b>
Statistical analysis via ANOVA, '5601T' <i>differs significantly</i> from 'Hutcheson' F-value = 9.72, P-value = 0.0109 $R^2 = 74.2\%$ , CV = 2.6%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

*Seed Oil Concentration Table 2002. Mean Seed Oil Concentration, per location, in the 2002 USDA-ARS Southern Uniform Test.*

2002 Location	Seed Oil Concentration (g/kg dry weight)	
	'5601T'	'Hutcheson'
BIXBY,OK02	183	191
Knoxville,TN02	207	217
MCCUNE,KS02	208	203
ORANGE,VA02	189	194
PLYMOUTH,NC02	191	199
PORTAGEVILLE,MO(A)02	192	201
PRINCETON,KY02	199	204
PROSPER,TX02	193	203
STONEVILLE,MS02	186	214
ULLIN,IL02	197	211
WARSAW,VA02	189	189
<b>2002 Mean</b>	<b>194</b>	<b>202</b>
Statistical analysis via ANOVA, '5601T' differs significantly from 'Hutcheson' F-value = 11.08 , P-value = 0.0076 R <sup>2</sup> = 81.2%, CV = 3.0%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

*Seed Oil Concentration Table 1998-2002. Five-year mean*  
**Seed Oil Concentration** in the USDA-ARS Southern Uniform Tests

200400045

	<b>Seed Oil Concentration (g/kg dry weight)</b>	
<b>Year</b>	<b>'5601T'</b>	<b>'Hutcheson'</b>
1998	196	209
1999	187	198
2000	194	204
2001	206	213
2002	194	202
<b>Mean 1998-2002</b>	<b>196</b>	<b>205</b>
Statistical analysis via ANOVA, '5601T' <i>differs significantly</i> from 'Hutcheson' F-value = 99.13, P-value = 0.0001 $R^2 = 99.0\%$ , CV = 2.2%		

Uniform test plots typically consist of four-row plots, 20 feet in length,  
 Replicated 3-times per environment.



U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICEEXHIBIT E  
STATEMENT OF THE BASIS OF OWNERSHIP

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). The information is held confidential until the certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S)

Tennessee Advanced Genetics, Inc.

2. TEMPORARY DESIGNATION  
OR EXPERIMENTAL NUMBER

TN96-58

3. VARIETY NAME

5601T

4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP, and Country)

2640-C Nolensville Road  
Nashville, TN 37211

5. TELEPHONE (Include area code)

615-242-0467

6. FAX (Include area code)

615-248-3461

7. PVPO NUMBER

2004 0 004 5

8. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. If no, please explain

☒

YES

☐

NO

9. Is the applicant (individual or company) a U.S. National or a U.S. based company? If no, give name of country

☒

YES

☐

NO

10. Is the applicant the original owner?

☐

YES

☒

NO

If no, please answer one of the following:

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?

☐

YES

☐

NO

If no, give name of country

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?

☒

YES

☐

NO

If no, give name of country

11. Additional explanation on ownership (If needed, use the reverse for extra space):

Acquired from the University of Tennessee, Knoxville, TN 37996

## PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 6 minutes per response, including the time for reviewing the instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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